

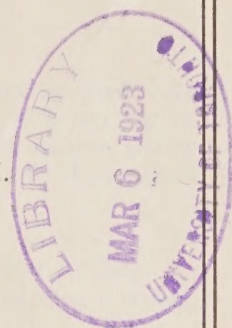
STEER FEEDING EXPERIMENTS IN PRINCE EDWARD ISLAND

1912 - 1922

By J. CLARK, B.S.A., Superintendent,
Experimental Station, Charlottetown, P.E.I.

AND

B. FRANK TINNEY, B.S.A., Assistant



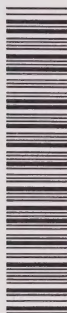
A High Quality Steer
Charlottetown Experimental Station

DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
PAMPHLET NO. 23—NEW SERIES

THE EXPERIMENTAL FARMS BRANCH

E. S. ARCHIBALD, B.A., B.S.A., Director

Published by direction of the Hon. W. R. Motherwell, Minister of Agriculture,
Ottawa, 1923



3 1761 12000521 0

OTTAWA
F. A. ACLAND
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1923

VALUE OF STEER FEEDING

INTRODUCTION

Observation over many years, in this as well as in other countries, leads conclusively to the opinion that, if mixed farming is to be carried on with any degree of success, we must make frequent and fairly liberal applications of organic matter to the soil. This organic matter can be supplied in no better way than by the application of stable manure.

The object of this pamphlet is two-fold:—

(a) To outline to some extent the profit to be derived from steer feeding.

(b) To point out some of the indirect advantages, advantages that it would be hard satisfactorily to value in terms of dollars and cents.

Under the first head we have discussed the relative merits of beef type vs. dairy type steers; good, thrifty vs. poor quality steers; feeding of steers vs. feeding of dry cows; methods of feeding, etc.

Under the second, perhaps the strongest argument in favour of winter finishing of steers is to be found, viz., the utilization of coarse farm feeds, otherwise unmarketable, and the production of very large quantities of manure that may be used in the maintenance and improvement of soil fertility.

It has been our purpose as far as possible to make this pamphlet "readable" rather than technical, and to this end we have eliminated complex or complicated tables and charts. We realize the incompleteness of this small work, but trust it may assist in straightening out many of the difficulties encountered by the farmer. In case further information is desired on any of the questions contained in this pamphlet or on any other question concerning the winter feeding of steers, we shall be only too pleased to supply such on application to the Superintendent, Experimental Station, Charlottetown, P.E.I.

The work in steer feeding at this Station, up to the present time, has been concerned entirely with winter feeding. All the animals used in the work are purchased early in the autumn, pastured for a short time as a preliminary to actual feeding tests, tested for tuberculosis, then when the weather gets cool, just previous to starting feed tests, all the animals are dehorned.

DEHORNING

We have employed only one method of dehorning at this Station: the steers are thrown with a rope, three half-hitches being placed around the body, the animals are securely tied, and the horns removed with a fine-toothed meat saw, as close to the head as possible. Observation tends to the conclusion that bleeding is very considerably less if the horn is cut close to the head. Cold water is used to check the flow of blood, and the steer is released and allowed to get on his feet almost immediately. In the early years of our work, the horn was left one-quarter to one-half inch long. In some cases tar was applied and the stub bound up, creolin also was tried, but we believe the greatest satisfaction is attained by cutting close to the head, applying a douche of cold water, and leaving the stub without a covering.

Value of Dehorning.—With our present accommodation, and we believe this is true on most farms, it would be impossible to fatten steers with the horns on without tying the animals, for fear of injury to one another. This would, of course, greatly

increase the amount of labour required in feeding. We can recall only one instance of seeing horned steers being fed loose in box stalls, and these were losing weight. Dehorned steers are quieter, and feed very much better.

Purchasing Horned or Dehorned Steers.—It is out of the question to purchase dehorned steers in this province. The only dehorned steers procured by this Station for our feeding work were a pair purchased at the Amherst (Nova Scotia) Winter Fair. These were for demonstration purposes, and were finished for the block when purchased.

Time Required for Dehorning.—We find that four men dehorn 16 steers in $2\frac{1}{2}$ hours. Paid at the rate of 30 cents per hour, their wages would amount to \$3 for 16 steers, or $18\frac{3}{4}$ cents per steer. The only instrument required is a meat-saw, costing approximately \$1.50. The one used at this Station was purchased at that figure in 1912, and, besides other work, has dehorned 162 steers, and is still in good condition.

Effect of Dehorning on Animals.—We have never had any serious setback from dehorning, nor have we found that steers lose much weight. Occasionally a steer will be dull and feverish for a few days, due to a horn becoming infected. During the autumn of 1916 for example, 16 steers were weighed on November 3, then dehorned and arranged in pens on November 4. The weight of each steer is given in the following table every week until the new year, showing a steady gain from week to week:—

TABLES OF WEIGHTS, 1916

Steer	Weight before de-horning Nov. 3	Weekly Weights for two months after dehorning							Gain
		Nov. 13	Nov. 20	Nov. 27	Dec. 4	Dec. 11	Dec. 18	Jan. 2	
No.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
80.....	1,040	1,090	1,105	1,140	1,140	1,200	1,230	1,210	170
81.....	1,105	1,140	1,150	1,180	1,180	1,240	1,250	1,300	195
82.....	885	890	915	940	920	960	1,000	990	105
83.....	850	860	885	910	910	880	970	980	130
84.....	860	910	920	920	940	960	1,000	980	120
85.....	800	850	870	910	920	930	900	935	135
86.....	875	920	920	950	990	1,000	1,040	1,035	160
87.....	1,000	1,060	1,050	1,050	1,050	1,080	1,090	1,110	110
88.....	930	975	990	1,050	1,000	1,010	1,050	960 (S)	30
89.....	875	925	920	940	930	960	1,000	1,000	125
90.....	970	1,000	1,015	1,090	1,090	1,130	1,140	1,175	205
91.....	830	870	870	910	920	1,000	950 (S)	1,000	170
92.....	780	810	830	850	900	925	950	950	170
93.....	790	830	860	930	930	1,000	990	1,000	210
94.....	885	925	950	970	970	1,020	1,020	1,040	155
95.....	900	965	960	970	1,000	1,030	1,030	1,035	135
96.....	710	740	750	750	790	840	850	865	155
97.....	1,080	1,080	1,075	1,135	1,130	1,180	1,210	1,240	160
98.....	975	1,030	1,020	1,080	1,000	1,120	1,110	1,190	215
99.....	880	880	890	890 (I)	900	960	970	975	95
Total.....	18,020	18,760	18,955	19,565	19,610	20,525	20,750	20,970	2,950
Total Gain.....		740	935	1,545	1,590	2,505	2,730	2,950	.....
Average gain per steer.....		37	46 $\frac{3}{4}$	77 $\frac{1}{4}$	79 $\frac{1}{2}$	125 $\frac{1}{4}$	136 $\frac{1}{2}$	147 $\frac{1}{2}$	.....

(S) Sick. (I) Infected horn.

Notes, taken each week *re* dehorning and condition of steers during this period, read as follows:—

November 11—Steers recovering very rapidly from dehorning, apparently no discomfort after operation.

November 18—All steers making excellent gains.

November 25—One steer, No. 99, not making such good gains. Had infected horn, but seems to be coming along all right.

December 2—Steer 99 quite better.

December 9—All steers making excellent gains.

December 16—One steer, No. 91, ate too much, starved for a day or so, coming all right.

December 23—Steer No. 88 was off feed, but is now all right.

December 30—All steers healthy.

GENERAL NOTES ON DEHORNING

We have no conclusive data to offer on the feeding of horned versus dehorned cattle.

The length of period of recovery varies; most of the steers have not had any serious setback.

Records are as follows:—

1912—Steers came along all right.

1913—Dehorned steers doing very well.

1914—Dehorned steers doing very nicely.

1915—Steers dehorned, all doing well and healing nicely in 10 days.

1916—Out of 20 steers dehorned, only one horn infected, this healed in 22 days.

1917—Only one horn infected, dehorned on October 13, and all healed by November 10.

1918—Twenty-eight steers dehorned October 23, all healed by November 9.

1919—Dehorned December 1, and all healed by December 27.

1920—Dehorned 16 steers November 1. Did well. Steer 240 had infected horn, and sick from December 1, but all better by December 11.

1921—Steers dehorned November 1; horns all healed by December 3.

We have found the best season for dehorning to be as soon as all flies have disappeared in the autumn. Dates we have dehorned run from October 13 to December 1.

The use of Caustic Potash for Removing Horns from Calves.—The easiest, least painful and most humane way to remove the horns is by the use of caustic potash when the animal is only a few days old. Caustic potash is sold in sticks about the thickness of a lead pencil, and may be purchased at any drug store for about 10 or 15 cents. Best results are obtained if the operation is performed when the calf is not over ten days old.

First, clip off the hair over and around the horn button. Apply vaseline around the edges of this clipped portion, to prevent the spreading of the caustic potash when applied. Slightly moisten the end of the caustic stick and rub it on each horn button alternately four or five times, allowing each application to dry before applying the next. The stick should be wrapped in paper to prevent burning the hands. A neater job, with a smaller resultant sore, is obtained when the stick is only slightly moistened. Do not allow calves to run in wet grass or in rain for several hours after the application, or the caustic will be washed off. Never moisten the stick with the tongue, and be careful of the animal's eyes.

Do you realize that if each farmer continued to employ the above method with all animals, horns, the greatest handicap in the feed lot, would be abolished in from two to three years' time? Animals would then be more contented and thrifty, and after making greater gains with less feed and labour, would eventually kill out in much better shape and grade higher in quality. It pays in dollars and cents—try it.

THE GAINS IN WINTER-FINISHING OF GOOD VS. POOR TYPES OF STEERS

Over a considerable period of time, observation, on our part, tends to the belief that it is not profitable to feed poor type feeders, old, dry cows, or very thin, unthrifty steers.

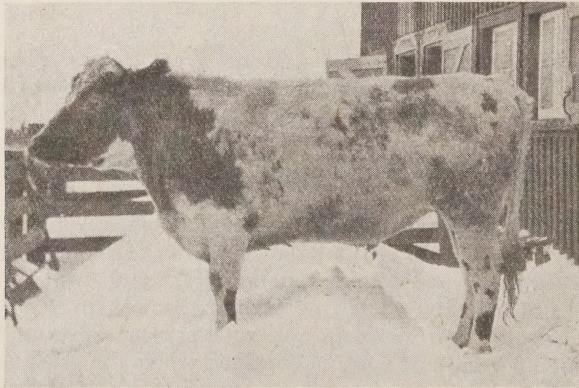
During the winter of 1912-13, and again in 1913-14, and later in the winter of 1917-18, experiments were conducted on the "Profits to be Derived from Feeding Good Type vs. Poor Type Steers." In 1912-13, seven dairy type steers, running from



Poor Type Feeder
Charlottetown Experimental Station

poor to medium feeders, when placed in the pens made an average profit per animal of \$7.20, while six beef type steers, in about the same condition when the feeding experiment started, made an average profit of \$9.17 per animal.

In 1913-14, a pen of four Holstein grade steers, in good condition, made an average profit of \$8.18, while three beef type steers, in thrifty condition, made an average gain per animal of \$17.28.



Medium Quality Feeder
Charlottetown Experimental Station

In 1917-18, eight dairy type steers gave a net profit of \$11.72 per animal, while 12 beef type steers, similarly fed, gave a profit per animal of \$14.25.

Summarizing results for these three years, we find that 19 dairy type steers gave an average profit of \$9.31 per animal, while 21 beef type steers made a profit per animal of \$13.23.

In addition to the greater profit obtained, the beef steers, when placed on the market, were better and more uniform in quality.

During the winter 1919-20, an experiment was conducted to note the relative value of "Dry Cows vs. Steers" as feeders.

Lot I, four scrub dry cows, gave a net loss of \$6.60 per animal.

Lot II, four Shorthorn and Shorthorn grade dry cows, gave a net loss of \$4.35 per animal.

Lot III, four grade dairy steers, gave a net profit of \$8.37 per animal.

Lot IV, four grade Shorthorn steers, gave an average profit of \$14.85 per animal.

Based on this one year's experiment, the evidence tends to prove that it is not profitable to stall feed dry cows.

COST OF FEED PER STEER, AND COST PER POUND GAIN

Without going into the question of the amount of different feeds consumed, or discussing the varying market prices for different feeds during different years, the following is offered as the cost of feed per steer covering an eight-year period from 1912-20. During that time, 144 animals were fed a total of 17,945 days, or an average feed period per animal of 125 days. During this time they consumed feed to the value of \$4,239.24, or an average cost of feed per animal of \$29.43. The total gain in weight for the period was 33,200 pounds, or an average of 230 pounds per animal. This gives a cost of \$29.43 for 230 pounds gain, or an average cost of 12.8 cents for one pound gain.

PROFITS PER STEER

In the estimation of profits per steer, cost of labour was disregarded, being considered balanced by the value of manure produced. The average initial cost of the 144 steers fed during the eight-year period 1912-20 was \$61.35, ranging from a low price of \$28.80 per animal in 1912 to the high figure of \$101.77 for a single animal in 1920. Adding to this the average cost of feed per animal of \$29.43, we have an average gross cost per animal of \$90.78. The average selling price per animal for this period was \$112.02, or an average net profit of \$21.24.

BUILDINGS

In the matter of buildings it might be pointed out that expensive equipment is not required. Carefully built stalls with cement gutters, cement feed troughs, steel stanchions and stalls, as found in a well-equipped dairy barn, are wholly unnecessary in steer feeding work, and even tie chains are not needed if the steers are dehorned. A roomy, well-ventilated shed, free from draughts and fitted with large pens or box stalls, is amply sufficient to ensure success in feeding work. Where a large number of steers is being fed, a feed and litter carrier will pay for itself in the saving of labour, and a ready means of supplying drinking water is also advised. All feeds should be stored close at hand, so as to save time in feeding. With reasonably convenient facilities, one man can attend to thirty animals in addition to his other work on the farm.

Handling of Manure.—Fairly large pens, say large enough for about eight or ten steers, contribute materially toward the saving of labour, in that it is unnecessary to clean them so often. Where straw or other bedding material is abundant, it is possible to convert very large quantities of this into first-class fertilizer by leaving it in the pens for several days to be tramped and chopped by the steers. The use of large pens makes unnecessary the daily cleaning which would be required were the animals tied in stalls. The production of large quantities of manure is perhaps one of the greatest benefits derived by the farmer from the feeding of steers. Taken from this standpoint alone, the winter finishing of steers on the average farm is to be recommended.

FEEDS

The economic utilization of the rough, unmarketable feeds on the farm, and the retaining of the manure thus made for the improvement of soil fertility, are points the farmer should never lose sight of. The greater the distance from a ready market, with correspondingly increased difficulties in the matter of handling and transporting bulky fodder and grain crops, to say nothing of excessive freight rates, the more economically can such feeds be disposed of through the medium of live stock.

From the farmer's and feeder's standpoint, the feeds that can be grown in the Maritime Provinces and marketed economically through beef cattle may be divided into:

- (1) Dry roughages;
- (2) Succulent roughages;
- (3) Grains.

Dry Roughages

Legume Hays.—Alfalfa hay is without doubt the most valuable roughage that can be fed to cattle, but as its production in this province is very uncertain, as well as unprofitable, we will disregard it in our calculations.

Clover.—Undoubtedly, in Eastern Canada, clover hay is the crop which can be recommend most generally. Not only is it of high feeding value for beef cattle, but it readily fits into any of our more popular crop rotations, and it is a first-class soil improver. Under suitable conditions, it yields as high a tonnage per acre as any other of the legume hays, and is suitable for young, growing cattle, for stockers, and for fattening cattle.

Timothy and Other Grass Hays.—Timothy is perhaps the standard hay crop for this province, and is therefore the most commonly used in feeding work. It is not nearly so palatable and nutritious as clover hay, nor is it so economical to grow. It works in well in a long rotation, but the long rotation is not usually an economical one.

Hay from other grasses, and native marsh hay, are often available at very reasonable cost. These, like timothy, are not the highest quality feeds, but their low cost, coupled with the fact that they are usually available in large quantities, make it imperative that they be considered. Where this hay is abundant, the cattle may be permitted to pick over the best part, and the balance used for bedding purposes. If chopped and mixed with ensilage or pulped roots, such hay is made much more palatable and digestible.

Straw.—Straw from the various cereals, if of good quality, can be used to advantage in beef cattle feeding. If used as the sole dry roughage, it must be balanced by plenty of succulent feeds such as roots, silage, etc., and by a grain ration high in protein. As when using inferior quality hay, straw can be made more palatable and digestible if chopped and mixed with silage or pulped roots.

Annual Hay Crops.—In some instances, as where a new seeding has been winter killed, or where the acreage devoted to hay is not likely to meet the winter's feed requirements, an additional tonnage of hay may be grown from some form of spring-sown crop. Perhaps the most popular crop for this purpose is oats; no doubt because they are a crop with which the farmer is well acquainted, because the seed is cheap, and, quality considered, the yield of hay is usually equal to that of any other of the annual crops, with the possible exception of peas and oats.

Oats alone should be seeded at the rate of three bushels per acre, oats and peas at the rate of two bushels and one bushel per acre respectively, and oats, peas and vetches at the rate of two bushels, three-quarter bushel and one-quarter bushel respectively. These crops should be cut for hay when the grain is in the late milk or soft dough stage.

Succulent Roughages

Ensilages.—Corn silage is undoubtedly the most satisfactory succulent roughage for the winter feeding of beef cattle. Properly grown and ensiled, it is one of the most economical crops to grow and store, is equally as palatable as roots, besides being one of the most important crops in the rotation from a soil-improving and weed-removing standpoint.

Where corn is not dependable or cannot be grown successfully, there are other crops that can be used economically as silage. Probably chief of these, at least from a tonnage standpoint, is the sunflower, a comparatively new silage crop, which is gaining rapid favour in the west. It will do well where corn cannot be grown, and yields a heavy tonnage of fairly palatable silage, though in palatability it does not equal corn or even good oats, peas and vetch silage. It takes the same place in the crop rotation as corn, and is planted, cultivated and harvested in the same way, the cutting being done when the plants are nicely in bloom. If left until later, the silage is likely to be strong and rancid, on account of the heavy percentage of oil in the seeds. In various tests with dairy cattle, sunflower silage has proved almost equal in feeding value to corn.

Oats and peas, or oats, peas and vetches, or a mixture of any of the cereals, will make an excellent and palatable ensilage if cut sufficiently green and well tramped into the silo. In districts where corn or sunflowers can be grown, however, the tonnage is not sufficiently high to warrant the growing of grains as a silage crop. They should be cut when just heading out, when the stalks are still juicy, and should be placed in the silo immediately. On account of the hollow stem they need an extra amount of tramping and packing to exclude all air, and may even require the addition of water as the silo is being filled.

In the absence of a silo, or if sufficient silo room is not available, all the crops mentioned, except sunflowers, could be made into hay, or stover (in the case of corn). This, of course, requires more handling, and in the case of corn there is a certain amount of waste in handling the coarse stalks unless put through a cutting box.

Roots.—Where silage can be grown successfully, it is extremely doubtful whether it is profitable to grow roots for beef cattle. However, where silage is not available, it is advisable to grow a sufficient acreage of roots to supply the necessary succulent feed required in the ration. Where there is no danger from club root, turnips (swedes) are usually looked upon as the best class of root for fattening stock; mangels or half sugar beets may be grown where turnips cannot be grown successfully.

Besides entailing considerably more labour to produce than a silage crop, roots require frost-proof storage space, and this is sometimes difficult to get. They are valuable in the rotation as well as in the ration, and, when conditions warrant, should be used.

Grain.—The profits to be derived from the feeding of beef cattle depend largely upon the amount of home-grown roughages that can be utilized. All of the previously mentioned roughages should be, as far as possible, home-grown, and the larger the percentage of grains or concentrates that can be produced at home, the greater will be the profits derived. It is often economical to purchase some concentrates, but this applies more particularly to the high grade, protein-rich concentrates that cannot be produced on the farm.

Barley is perhaps the greatest fattening grain produced in this province, and it is to be regretted that, despite the fact that it is a paying crop, the acreage for several years has dropped rather low. Recently, however, it has been receiving more well-merited attention. In point of yield it usually equals, or even surpasses, that of oats (pound for pound), and in feeding value for fattening purposes is fully 10 per cent superior to oats. Oats are better as a growing food than for fattening, and will do

well for young stock. In an experiment carried on at this Station during the winter of 1918-19, demonstrating the relative value of barley and oats, with and without the addition of other concentrates, we obtained the following results:—

Lot I, fed ground oats, other concentrates, and blood meal, the average profit per animal was.. . . .	\$51 40
Lot II, fed similarly, but without blood meal; average profit per animal.. . . .	54 83
Lot III, fed ground barley, other concentrates, and blood meal, average profit per animal.. . . .	56 83
Lot IV, fed similarly to lot III, but without blood meal, average profit per animal	59 46

Each lot consisted of four steers. On the eight steers comprising lots I and II, fed on oats, the average profit per animal was \$53.11, while on lots III and IV, fed on ground barley, the average profit per animal was \$58.15. This shows an increased profit in favour of barley of \$5.04, or just about 10 per cent, and supplements the statement previously made.

Purchased Concentrates.—If it is found necessary to supplement the home-grown grains by purchased feeds, corn will usually prove to be one of the most economical. Recleaned screenings, if they can be purchased at reasonable prices, and of good quality, are also valuable in the feed lot. Success with screenings depends on the quality and price, but they are worth investigation by the feeder. If protein-rich concentrates are required to balance the ration, oil-cake meal or cotton-seed meal should be chosen, and the higher the percentage of protein in these the better, provided the price is at all proportional. Where there is a lack of succulence in the feed, oilcake should always be chosen. If the ration is sufficiently succulent, then the choice depends on which is the cheaper per pound of protein contained.

The following table gives the total dry matter, as well as the total digestible protein, carbo-hydrates and fat of the various feeds mentioned. The column to the right of the table gives the total digestible nutrients in one ton of each feed. Within certain limits, these figures are an indication of the relative value of the respective feeds:—

DIGESTIBLE NUTRIENTS IN FEEDS MENTIONED

Feeds	Total Dry Matter per 100 lb.	Digestible Nutrients in 100 pounds			Total Digestible Nutrients in one ton
		Protein	Carbo-hydrates	Fat	
	lb.	lb.	lb.	lb.	lb.
Clover hay.....	87.1	7.6	39.3	1.8	1,018
Alfalfa hay.....	91.4	10.6	39.0	0.9	1,032
Clover and mixed grass hay.....	89.9	4.7	39.9	1.3	950
Timothy hay.....	88.4	3.0	42.8	1.2	970
Swamp grasses.....	90.2	3.5	40.1	0.8	908
Mixed grasses.....	87.2	4.3	44.3	1.2	1,026
Straw (oats).....	88.5	1.0	42.6	0.9	912
Straw (barley).....	85.8	0.9	40.2	0.6	850
Straw (wheat).....	91.6	0.7	35.1	0.5	738
Oat hay.....	88.0	4.5	38.1	1.7	928
Peas and oats hay.....	83.4	8.3	37.1	1.5	976
Feed ler corn.....	81.7	3.0	47.3	1.5	1,074

SUCCULENT ROUGHAGES

Corn silage.....	23.83	0.98	12.29	2.11	360
Sunflower silage.....	25.62	0.99	13.03	1.31	339
Peas and oats silage.....	29.97	3.05	13.80	1.28	395
Mangels.....	9.40	0.8	6.4	0.1	148
Turnips (swedes).....	10.9	1.0	7.7	0.3	188

CONCENTRATES

Feeds	Total dry matter per 100 lb.	Digestible Nutrients in 100 pounds			Total Digestible Nutrients in one ton
		Protein	Carbo-hydrates	Fat	
	lb.	lb.	lb.	lb.	lb.
Dent corn.....	89.5	7.5	67.8	4.6	1,714
Barley.....	90.7	9.0	66.8	1.6	1,588
Oats.....	90.8	9.7	52.1	3.8	1,408
Peas.....	90.8	19.0	55.8	0.6	1,524
Screenings (good average grade).....	88.62	10.2	44.94	5.03	1,329
Oil cake meal.....	90.4	31.7	37.9	2.80	1,518
Cotton seed meal (choice grade).....	92.5	37.0	21.8	8.6	1,564
Bran.....	89.6	11.9	43.3	3.0	1,240

RATIONS

Henry & Morrison ("Feeds and Feeding") give the modified Wolff-Lehmann standard for growing fattening steers as follows:—

Live weight	Per day per 1,000 lb live weight			Nutritive Ratio
	Dry Matter	Digestible Crude Protein	Total Digestible Nutrients	
	lb.	lb.	lb.	
900 pounds.....	20.2	2.0	13.6	1:5.8
1,000 ".....	19.7	1.8	13.5	1:6.5
1,100 ".....	18.1	1.6	12.6	1:6.9
1,200 ".....	17.3	1.5	12.3	1:7.2

In the balancing of a ration, one must not lose sight of palatability and succulence. Any number of rations can be made out that will balance correctly from a theoretical standpoint, that are yet quite unsuited for any practical use, as for example:—

10 pounds barley straw.
8 pounds marsh hay.
4 pounds cotton-seed meal.

Theoretically this ration will balance fairly well for a 1,000-pound steer, but, as can readily be seen, it provides neither for succulence nor palatability.

Following are several suggested rations that we believe will prove successful in steer feeding work:—

Rations for early part of feeding period:

Per day, per thousand pounds live weight.

Ration I: 30 pounds corn silage
10 " clover hay
4 " ground barley
 $\frac{1}{2}$ " cotton-seed meal

Ration II: 50 pounds turnips
10 " clover
5 " cracked oats

Ration III: 50 pounds mangels
8 " timothy hay
5 " oat straw
4 " ground barley
 $\frac{1}{2}$ " oilcake meal

Rations for Finishing Period:

Per day, per 1,000 pounds live weight.

<i>Ration I:</i>	20 pounds	corn silage
	10 "	clover hay
	3 "	ground barley
	3 "	ground oats
	$\frac{1}{2}$ "	oilcake meal

<i>Ration II:</i>	20 pounds	turnips
	10 "	timothy hay
	6 "	ground barley
	2 "	bran

The rations outlined above have been purposely made up from feeds commonly grown or easily obtained by the farmer. Such feeds as can be grown by the farmer usually come cheaper to him than feeds purchased from outside sources.

METHODS OF FEEDING

In 1916-17 an experiment of "Heavy vs. Light Feeding of Roots" was conducted. In beef steers, the first lot was fed a fairly heavy root ration throughout the entire period. This lot (four steers) made a net profit of \$81.29. The second lot (four



Smoothly Finished Steers

steers) started the test on the same quantity of roots per day as did the first lot, but the root ration was gradually decreased toward the end of the experiment. This lot made a profit of \$145.97, or \$64.68 greater profit in favour of decreasing root ration.

With dairy type steers, the pen (four steers) receiving a heavy ration throughout the test made a net profit of \$55.61, while the pen receiving a decreasing root ration made a profit of \$164.24, or \$108.63 greater than the heavily fed lot.

These tests tend to the conclusion that it is inadvisable to carry a heavy root ration throughout the feeding period.

During the winter of 1920-21 and 1921-22 experiments were carried on at this Station in an effort to determine relative merits of different methods of preparing feeds. An outline of the experiment is as follows:—

Lot I.—Roots, grain and hay fed separately, roots and hay fed unchopped.

Lot II.—Roots, grain and hay fed separately, roots and hay chopped.

Lot III.—All feed materials thoroughly mixed before feeding. Roots and hay chopped.

Lot IV.—Roots and hay chopped, all feeds thoroughly mixed and moistened before feeding.

Tentative conclusions arrived at from these experiments indicate that it is generally profitable to chop hay and roots for steers.

Also, that any very elaborate system of preparing feeds will prove unprofitable owing to the large amount of labour involved.

Further experiments are to be conducted on methods of feeding and preparation of feeds, when it is hoped more light will be thrown on this subject.

AMOUNT OF FEEDS PER POUND GAIN

The experiments carried on in 1920-21 and 1921-22 are suitable for a demonstration of the amount of different feeds required for one pound of gain.

FEED CONSUMED

Year	Number Days Fed	Total Pounds Gain	Number Steers Fed	Hay	Roots	Oats	Screen- ings	Bran	Corn- meal	Cotton- seed Meal	Oil- cake Meal	Barley	Oat Straw for feed	Middlings
		lb.		lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
1920-21.....	98	3,445	16	15,680	59,740	3,830	3,830	2,104	968	856	472	550	680	
1921-22.....	147	5,380	16	23,520	88,200	5,692	.....	2,572	2,032	888	964	700	.....	6,240

Based on the above figures we find the amount of feeds required per pound gain to be as follows:—

Feeds	1920-21	1921-22	Average for two years
	lb.	lb.	lb.
Hay.....	4.551	4.371	4.461
Roots.....	17.341	16.393	16.867
Oats.....	1.111	1.058	1.085
Screenings.....	1.111		
Bran.....	0.610	0.478	0.544
Cornmeal.....	0.281	0.377	0.329
Cotton seed meal.....	0.277	0.165	0.221
Oil cake meal.....	0.137	0.179	0.158
Barley.....	0.159	0.130	0.145
Oat straw for feed.....	0.197		
Middlings.....		1.159	

Or, taking the amount of feed consumed, as given in the first table, and figuring the total digestible nutrients contained, we get the following:—

TOTAL DIGESTIBLE NUTRIENTS IN FEED CONSUMED

Feed	1920-21 Total Digestible Nutrients	1921-22 Total Digestible Nutrients
	lb.	lb.
Hay.....	7,448	11,172
Roots.....	5,515	8,290
Oats.....	2,696	4,010
Screenings.....	2,490	
Bran.....	1,262	1,543
Corn meal.....	823	1,727
Cotton seed meal.....	742	694
Oil cake meal.....	358	732
Barley.....	437	555
Oat straw for feed.....	310	
Middlings.....		4,368
Total.....	22,081	33,091

In 1920-21 a total gain of 3,445 pounds was made from 22,081 pounds total digestible nutrients, or 6.4 pounds total digestible nutrients were required for one pound of gain. In 1921-22, 33,091 pounds of digestible nutrients gave a gain of 5,380 pounds, or 6.15 pounds total digestible nutrients were required for one pound of gain. Average total digestible nutrients required for one pound of gain, 6.27 pounds.

As it has always been customary to work out our experiments on the basis of arbitrary prices for farm grown feeds, or else by charging these feeds at prevailing market prices, we believe it would be of interest and profit to the farmer to know what these feeds are worth when marketed through the medium of beef cattle. The method of approximating these values was as follows:—

To the original cost price of the steers was added the cost of all purchased commercial feeds, such as bran, oil cake meal, cotton seed meal, etc. This total was deducted from the sale price of the animals, leaving a balance representing the price received for the total amount of home-grown feeds used. The price apportioned to

each separate feed was based on the number of pounds of total digestible nutrients in each. Based on these calculations, the following prices have been realized for farm feeds at this Station, for the period of years mentioned:—

PRICES REALIZED FOR HOME-GROWN FEEDS

Feed	Number of years fed	Average Price per Unit
Turnips.....	10	\$5.30 per ton.
Hay.....	10	\$27.04 “
Oats.....	10	67.4 cents per bush.
Barley.....	9	\$1.11 per bush.
Peas.....	3	90.66 cents per bush.

As will readily be seen, prices such as these are much above the average market price for these products over the same period of years.

In addition to increased returns for home-grown roughages and grains, the winter feeding of beef cattle ensures a more even distribution of labour on the farm. Hired help can be given steady employment. In addition to this, we frequently find a more ready market for finished steers than we do for feeds, particularly when feed is plentiful and prices low.

SUMMARY AND GENERAL CONCLUSIONS

(1) The winter finishing of steers in mixed farming sections is strongly recommended because,—

- (a) It provides the large quantities of manure so necessary to maintain soil fertility;
- (b) It gives a fair profit over and above investment;
- (c) It provides a more ready market for coarse, home-grown roughages that are not always saleable;
- (d) It gives a high sale value to home-grown feeds of all sorts;
- (e) It makes for a more even distribution of farm labour throughout the year.

(2) *Dehorning*.—Dehorned steers are more contented, make better gains, go on the market in better shape, with less loss, therefore commanding a higher price.

(3) *Type of Steer to Feed*.—In all our feeding work we have found it more profitable to feed the low, blocky, thick-set steer rather than the rangy “dairy type” steer. In any case the animal should be thrifty and strong.

(4) *Dry Cows*.—Where any reasonable price can be obtained for dry cows in the autumn, it is extremely doubtful if they could be winter-fed at a profit.

(5) *Buildings*.—Expensive buildings and equipment are unnecessary.

(6) *Home-Grown Feeds*.—These can be marketed more readily and more profitably through the medium of steer feeding than in any other way.